IN THE CLAIMS:

1. (Currently Amended) A communication system comprising:

a source of energy to propagate a signal along a communication path;

a detector positioned in the communication path; and

a filtering system disposed in the optical path, the filtering system having first and second holographic optical elements each of which has a transform function associated therewith to~~,~~ encode the signal, defining an encoded signal, and decode the encoded signal to retrieve the signal for detection by the detector, with the transform function associated with said first holographic optical element matching the transform function associated with said second holographic element.

2. (Original) The system as recited in claim 1 wherein the filtering system removes unwanted characteristics from the signal with the unwanted characteristics being selected from a group consisting essentially of amplitude, polarization, wavelength and phase.

3. (Original) The system as recited in claim 1 wherein the first and second filtering system is a transmissive element, allowing the signal to propagate between opposing surfaces thereof.

4. (Original) The system as recited in claim 1 wherein the filtering system is a reflective element,

allowing the signal to enter and exit the element through a common surface.

5. (Original) The system as recited in claim 1 wherein the signal is an optical signal.

6. (Original) The system as recited in claim 1 wherein the signal is an RF signal having a wavelength in the range of in the range of 1 micron to 1 millimeter, inclusive.

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7. (Original) The system as recited in claim 1 wherein the source of energy includes an array of transmitters to generate a plurality of the signals to propagate along a plurality of axes and the detector includes an array of receivers, each of which is positioned to sense one of the plurality of signals propagating along one of the plurality of axes and the filtering system includes an array of filtering systems, each of which is disposed in one of the plurality of axes, with a subset of the filtering systems of the array having a surface with the polarizing film being recorded thereon and the holographic transform disposed in a volume thereof.

8. (Original) The system as recited in claim 1 wherein the source of energy includes an array of transmitters to generate energy to propagate along a plurality of axes and the detector includes an array of receivers, each of which is positioned to sense energy propagating along one of the plurality of axes and the filtering system includes a plurality of filtering systems, each of which has a holographic transform function recorded

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within a volume thereof, with the plurality of filtering systems being arranged in first and second arrays, the first array being disposed between the array of transmitters and the array of receivers and the second array being disposed between the first array and the receivers.

9. (Original) The system as recited in claim 8 wherein the holographic transform function associated with a subgroup of the filtering systems of the first array, defining a transfer function, differs from the holographic transform function associated with the remaining filtering systems of the first array of filtering systems, and the holographic transform function associated with a subset of the filtering systems of the second array matches the transfer function.

10. (Original) The system as recited in claim 1 wherein the filtering system includes an optical element has opposed sides with a spherical surface being positioned on one of the opposed sides and a planar surface being disposed on the remaining side of the opposed sides with the holographic transform function being recorded within a volume of the lens between the spherical and the planar surfaces.

11. (Original) The system as recited in claim 1 wherein the filtering system is an optical element having opposed sides with a cylindrical surface being positioned on one of the opposed sides and a planar surface being disposed on the remaining side of the opposed sides, with the holographic transform function being recorded within a

volume of the lens between the cylindrical and the planar surfaces.

12. (Original) The system as recited in claim 1 wherein the filtering system includes an optical element having opposed sides with a spherical surface being positioned on one of the opposed sides and a rotary symmetric arrangement of grooves defining a Fresnel lens being disposed on the remaining side of the opposed sides with the holographic transform function being recorded within a volume of the lens between the spherical surface and the Fresnel lens.

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13. (Original) The system as recited in claim 1 wherein the source of energy includes an array of optical transmitters to generate optical energy to propagate along a plurality of axes and the detector includes an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes and the filtering system includes an array of lenses, each of which is disposed in one of the plurality of axes and includes the arcuate surface with the holographic transform being recorded within a volume of the array of lenses.

14. (Original) The system as recited in claim 1 wherein the source of optical energy includes an array of optical transmitters to generate optical energy to propagate along a plurality of axes and the detector includes an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes and the filtering system

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includes a plurality of lenses having the arcuate surface with holographic transform function recorded within a volume thereof, with the plurality of lenses being arranged in first and second arrays, the first array being disposed between the array of optical transmitters and the array of optical receivers and the second array being disposed between the first array and the optical receivers.

15. (Currently Amended) A communication system comprising:

a source of energy to propagate a signal along a communication path;

a detector positioned in the communication path; and

a filtering system disposed between the source and the detector, the filtering system having first and second filtering apparatus, each of which has a transform function associated therewith~~, with the first filtering apparatus encoding~~ to encode the signal, defining an encoded signal, and ~~the second filtering apparatus decoding~~ decode the encoded signal to retrieve the signal for detection by the detector, with the transform function associated with said first filtering apparatus matching the transform function associated with said second filtering apparatus.

16. (Original) The system as recited in claim 15 wherein the source of optical energy includes an array of optical transmitters to generate optical energy to propagate along a plurality of axes and the detector includes an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes and the filtering system includes an array filtering systems lenses, each of which

includes the first and second filtering apparatuses, disposed in one of the plurality of axes, with each of the first and second filtering apparatus defining a lens having an arcuate surface with the transform function being recorded within a volume thereof.

17. (Original) The system as recited in claim 16 wherein the source of optical energy includes an array of optical transmitters to generate optical energy to propagate along a plurality of axes and the detector includes an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes and the optical system including a plurality of lenses having the arcuate surface with holographic transform function being disposed within a volume thereof, with the plurality of lenses being arranged in first and second arrays, the first array being disposed between the array of optical transmitters and the array of optical receivers and the second array being disposed between the first array and the optical receivers.

18. (Original) A communication system comprising:

an array of optical transmitters to generate optical energy to propagate along a plurality of axes;

an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes;

a first array of refractory lenses, each of which is disposed in one of the plurality of axes and having a transform function recorded throughout a volume, with the transform function associated with a subgroup of the lenses of the first array differing from the transform function

associated with the remaining lenses of the first array of lenses and defining an encoding function to encode the signal, forming an encoded signal; and

a second array of refractory lenses, each of which is disposed between the first array of lenses and the array of optical receivers to collect the encoded signal, with a subset of the lenses of the second array having a second transform function recorded in recorded in a second volume thereof, to retrieve the signal by decode the encoded signal and directing the signal onto one of the optical receivers.

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19. (Original) The system as recited in claim 18 wherein the lenses of the first and second arrays have a spherical surface and an additional surface disposed opposite to the spherical surface, with a Fresnel lens being disposed on the additional surface.

20. (Original) The system as recited in claim 18 wherein the lenses of the first and second arrays have a cylindrical surface and an additional surface disposed opposite to the cylindrical surface, with a Fresnel lens being disposed on the additional surface.

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